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THE NECESSITY FOR BETTER CORRELATION OF
RESEARCH ACTIVITIES IN THE FIELD OF AGRICULTURE

With Special Reference to Cotton Growing

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Recent emergencies arising out of the surplus dilemma have served to emphasize the necessity for better teamwork on the part of State and Federal research agencies. Without detracting in the least from the excellent spirit of cooperation which has prevailed in the past, the time has arrived for a greater amount of collective thinking and coordinated action in the solution of agricultural problems. In our efforts to improve the economic condition of the growers, the most must be made of our scientific resources. The obstacles confronting American agriculture must be more clearly visualized, and all the forces of modern science must be mustered and brought to bear upon their removal.

Concerning the growing demand for cooperation and correlation of research, Professor Knight Dunlap of Johns Hopkins University, in a press announcement of the National Institute of Psychology, made the following significant comment: "The day of the isolated experimenter and of fragmentary problems is passing. Unless we find means of shaping our problems into coherent plans of larger unity, unless we find means of carrying out vital research and postponing the merely interesting, and unless we can pool our constructive and critical abilities, we shall be out of step with the advance of the scientific method."

*Presented before Association of Southern Agricultural Workers, Jackson, Mississippi, February 5, 1930.

Though the foregoing quotation was made with reference to psychological researches, it applies none the less to the solution of agricultural problems.

The advantages of cooperation and the correlation of agricultural research have long been recognized but, for historical reasons, their full realization has been rather slow and tedious. Changing economic conditions and the lack of facilities for keeping abreast of them have tended to blur our vision of the major objectives to be attained. Progress in cooperation and coordination of effort has long been retarded by the stronger tendencies towards individualism which arose with the early development of our country. Our first successes in matters of cooperation were in the field of popular government; our next, in that of universal education; and our latest, in industry and agriculture.

Cooperation in American agriculture probably had its inception in the early-day agricultural societies which fostered cooperative buying and selling, and which played a leading role in the establishment of the Land-Grant colleges and the United States Department of Agriculture. Cooperation took a more definite form, however, in the development of the farm demonstration work so effectively promoted by the late Dr. Seaman A. Knapp. This work, of course, was the forerunner of our national system of cooperative agricultural extension work, created in 1914.

Out of the extension service has come a remarkable stimulation of the cooperative marketing movement. Though it has had its ups and downs, it is now making excellent headway. A Federal Farm Board has

been created by Congress and given broad powers pertaining to marketing. Its immediate purpose is to aid and encourage the growers to cooperate in the matter of marketing their farm products. Its ultimate objective is to help the farmers and their State and Federal research and extension forces to place American agriculture on a sound business basis. Evidently, the Board will be vitally concerned with better researches and better research relationships between State and Federal agricultural institutions.

Though a certain amount of cooperation has been maintained in agricultural research from its beginning, until recent years research has remained largely a matter of individual effort. Cooperation first began to take definite form in response to the emergencies created by the World War. It received its greatest impetus, however, following the passage of the Purnell Act in 1925. Since that date, cooperation has grown steadily, though not as fast as the increasing complexity of American farm problems has required.

The development of agricultural research in the United States has been a matter of progressive evolution. It began with the application of the natural sciences to the solution of farm problems. These sciences lend themselves rather readily to individual effort. They seemed to satisfy the early requirements of agriculture because, in those times, the farmers were evidently more conscious of their production problems than of their economic or social problems. The contributions which the natural science division of agricultural research have made to technical improvements in farm production are now matters of record. As the harvests have become more and more

abundant, the proportion of rural to urban population has tended to decline. Yet, with these increases in production, agricultural prosperity and rural standards of living have not made commensurate growth. The farmers of the United States have thus made greater progress in the arts of production than in the arts of business and of rural life.

With the rise of commercial agriculture, has come a better appreciation of its broader economic and social problems. The sciences of economics and sociology have been developed and added to the agricultural research family. Farm management, marketing, and rural life studies have begun to make important contributions to the body of agricultural knowledge in recent years. The tide has turned, and now the hope of the nation is that American agriculture may be given better balance and proportion throughout; that the producers may become not only more efficient in the arts of production but also more skillful in the arts of marketing, distribution, home-building, and rural living.

That the urgency of the need for teamwork and well-rounded programs of coordinated researches may be the more readily visualized, let us briefly take stock of the economic position of the agriculture of the Cotton Belt. For the purpose of this discussion, let us conceive of Cotton Belt agriculture as a single enterprise turning out a diversity of products, but whose main money-product is cotton.

As an industry, cotton growing is one of the most extensive and essential of the nation's business undertakings. It possesses fabulous resources including - above everything else - its millions of producers and their families; its hundreds of millions of acres of land in fields

and pastures; its favorable climatic conditions; its quota of farm equipments; its broad diversity of crops and livestock adaptations; its facilities for transportation and communication; its financial structure and credit facilities; its local, national, and world-wide markets for its cotton and other products; and, last but not least, its service institutions - the research and extension divisions of its Land-Grant colleges and Federal Department of Agriculture, the State departments of agriculture, and the Federal Farm Board.

The productive capacity - present, prospective, and potential - of this industry is so great that it has never been fathomed; made so in part by acreage expansion and in part by improvements in the processes of production. In market parlance the "stock" of this industry is low because it does not take the fullest advantage of technical and business principles, and it is lacking in purpose. Thus far, the cotton-growing industry has accepted no guiding policies, and every producer has vied with every other in creating large supplies of cotton without proper regard for costs per pound and effects upon prices and incomes.

Too often, the products of the industry are low or indifferent in quality because little, if any, incentive is offered in the farmers' markets for the production of cotton of superior spinning value or of other superior products. The pests, including hordes of weeds, boll weevils and other insects, plant diseases, and vermin, annually destroy from 10 to 40 per cent of the number of bales of cotton which otherwise would constitute a full yield - a loss equivalent to the

entire expense of planting and cultivating from 5 to 15 million acres of cotton land from which no crop is harvested.

Large areas of its soils are eroded and depleted of fertility, average yields are low and, consequently the costs per pound of lint are often excessive. Hundreds of thousands of its individual farms are too small to produce satisfactory incomes. Too much hand-labor and not enough labor-saving implements are employed. Ordinarily, so great is the size of the supply of cotton and so low is its spinning quality, that the price is inclined to sag to unprofitable levels. The supply of cotton as regards both quantity and quality is out of adjustment with the normal requirements of mill consumption. Much, therefore, is done to lower incomes and little to raise them.

The operating expenses of the industry are high relative to gross receipts and, conversely, the gross receipts are low relative to operating expenses. For these reasons, the net income to be distributed as dividends to the individual producer-stockholders is low, and this fact is reflected in land values and living standards. The purchasing power of the Cotton Belt is curtailed and this, in turn, affects the national prosperity.

Suppose for a moment that this giant industry were under a single, say, a producer-cooperative, management. What would this management do to place it on a sound business basis? If it acted with the same business acumen that is characteristic of other great productive enterprises, it would call in its technical and business experts and ask them to eliminate the leaks in the business, to reduce overhead and

operating expenses relative to receipts, and to devise ways and means of increasing receipts relative to operating expenses.

Besides inaugurating certain much-needed efficiencies and economies of a technical nature in the processes of production and marketing, the industry would endeavor to adjust the supply of its cotton and other commodities in point of both quantities and qualities to the normal requirements and preferences of ultimate consumers.

This, in effect, is what the cooperative extension services, the farm organizations, and the Federal Farm Board are endeavoring to accomplish. They are asking the agricultural research agencies, State and Federal, to furnish the fundamental facts upon which to base the improvements desired. This is also what the non-agricultural industries of the United States are now endeavoring to accomplish for themselves. They are spending an estimated \$200,000,000 a year of their own funds for researches leading to greater efficiencies and economies in production, improvements in the quality of products, better distribution, the extension of markets, and other means of strengthening market demand. Agriculture, with its estimated \$25,000,000 of public funds, can do no less. Having less to spend, every consistent effort should be made to spend to best possible advantage. This can be accomplished best by concentrating upon the more vital problems and pooling the nation's constructive resources.

Once farm products are sold on the basis of quality, the growers are well on their way towards the mastery of their own economic and social destinies. They then have a genuine incentive to produce the kinds of cotton, for example, which the spinners of the world really

need, and for which they can pay the most. The growers have a better vision of their own best interests and a tendency to profit thereby. They have an adequate incentive to practice better farming. Their incomes are better, and they have a more substantial basis for better homes and higher planes of living.

Everything humanly possible must be done to improve prices, but this is only a part of the task of improving the economic condition of the growers. What they are really striving for is not prices only, but greater profits and better incomes for such things as living expenses, the payment of debts, and savings. It is becoming more and more apparent that there are certain definite limitations upon the level to which the price of cotton may be maintained one year with another.

These limitations are set in part by the farmers themselves and in part by world competition. The farmers, as an unorganized group, are inclined to over-extend their cotton acreages following years of satisfactory prices, and to produce entirely too much cotton when conditions are favorable. In the consumers' markets, cotton must compete with rayon, silk, wool, and the products of other fibers. In the markets of the world, our raw cotton must compete with foreign growths, the supply of which is slowly but surely increasing in size. It is becoming more and more apparent that these foreign growths are gradually encroaching upon our European markets. Upon this point, the 1930 Outlook says: "Annual production of cotton in the United States has increased each year since 1927; world consumption of American

cotton has declined each season since 1926-27. Although world consumption of American cotton decreased, consumption of all growths increased about half a million bales in 1928-29 over 1927-28. World consumption of American cotton has been somewhat greater than production in each of those years but average annual prices for cotton at the ten spot markets were successively lower each year indicating a decreased demand for American cotton in this period." The remedy for the competition which cotton must meet in the markets of the world is better cotton, and this can never be had without the correlation of research and teamwork on the part of all the groups whose business it is to place the agriculture of the Cotton Belt on a sound business basis.

The question may be asked, Is this quest for better farm incomes but a rainbow chase, or does it bid fair to be crowned with success? The answer is that we, of all the nations of the earth, have the best opportunity for the maintenance of successful agriculture. With a clear scientific vision of the physical and economic possibilities of Cotton Belt agriculture, the future of the industry is bright. Whatever the united research forces of our country can envision or imagine for American agriculture, the farmers as a group and their business organizations can achieve.

After many years of trial and error and inconstant returns from cotton growing, the outlook is promising that something really worth while can and will be accomplished to place this enterprise on a more businesslike basis. It has been decided that success can be achieved the more speedily and effectively through collective planning and concerted action on the part of the research, extension, and business

groups interested in the welfare of Cotton Belt farmers. It has been decided, moreover, that now is the time for the organized effort to take definite form.

Now, what are some of the problems requiring joint effort for their solution, and how should the State and Federal research forces be deployed for the major offensive against these obstacles confronting the industry? Research problems, being no respecters of State and county boundaries, should be studied, so far as possible, simultaneously and by the same methods of procedure over the entire area affected. There are many local and regional problems in which the initiative of the State stations is not only proper but positively essential to the highest degree of success. In the case of the broader regional and national problems, the best headway can often be made in cooperation with appropriate branches of the Federal Department. Upon this point, Dr. A. F. Woods, Director of Scientific Work, has asked me to state that the Department is not inclined to assume any work of a local character which the State institutions can assume to as great or greater advantage. On the other hand, the Department sincerely wishes to be as helpful as it can to the State institutions.

The research problems of the Cotton Belt may be divided for convenience into four rather distinct but closely related groups. The first group pertains to the technical problems of production. These problems are to be solved by the natural science subject-matter specialists. The second group pertains to the economic problems of production, marketing, and distribution. These problems are to be solved by the farm management, marketing, and other types of agricultural

economists. The third group of problems pertains to home building or home economics which has not only its technical but its economic and sociological phases as well. These problems, of course, are to be solved by a diversity of talent working from the viewpoint of the rural home. The fourth group of problems pertains to standards and planes of living, socially considered. This group, of course, is to be solved by the rural sociologists. The four groups of problems, it will be observed, are inseparably bound together. One of these groups cannot be solved without solving the others. The practical approach to their joint solution is from the marketing angle.

Considerable headway has already been made in the development of the marketing approach. For the past few years, practically every Cotton Belt station has coordinated its research efforts with those of the Bureau of Agricultural Economics in the gathering of fundamental facts essential to successful cotton marketing. The result is that, for the first time in the history of American cotton growing industry, we have a rather clear picture of the grade and staple quality of the cotton produced. Moreover, we are beginning to understand conditions in the local or farmers' cotton markets, and why the quality of the American cotton crop is no better than it is. We are beginning to understand more about the legitimate requirements of spinners, in terms of both quantities and qualities needed.

No sooner had the correlated marketing studies gotten well under way than it was found that there was work ahead for many types of specialists other than marketing economists. For example, there was work for the textile engineer, in conducting spinning investigations;

the cotton physicist, in determining the physical properties of cotton fibers; the physiologist, in studying the environmental factors influencing fiber development; the agronomist, in studying varieties and their performances under varying cultural conditions; and plant breeders, in studying the inheritable characters influencing fiber properties, and in developing appropriate varieties. The agricultural engineers and agronomists at the Texas and Mississippi stations are cooperating with the divisions of cotton marketing and agricultural engineering of the Federal Department in the study of ginning problems, including the effect of different gin organizations and conditions of seed-cotton upon the out-turn and the quality of the staple.

During the past five years, an entire program of cotton utilization studies has been developed in which the several bureaus of the Departments of Agriculture and Commerce are cooperating. As a result of these studies, many new and additional industrial and household uses for cotton and cotton products have been discovered, and the demand for raw cotton improved.

The studies thus far conducted suggest still other opportunities for coordinated effort. They suggest the need for a Belt-wide study of the relation of soil fertility, commercial fertilizers, and other environmental factors upon the spinning quality, as well as the yields, of cotton. This is a problem in which not only the State stations but also the Bureaus of Chemistry and Soils and Plant Industry are deeply concerned. This study presumes a soil map of the Cotton Belt, which is far from complete.

Another example of the advantage of correlated effort is the study of cotton root rot in the Southwestern States. In this program of researches, the Texas Station and the Bureaus of Chemistry and Soils and Plant Industry have united their forces. A number of State and Federal research workers are carrying their respective phases of the major problem. The State and Federal chemists, for example, are studying the relation of soil types and fertilizers to the ravages of the root rot fungus. They are also studying methods of control by the use of chemical fungicides. The plant pathologists are studying the life-history and habits of the causal organism, and the agronomists are studying the effect of crop rotations and are endeavoring to develop root-rot-resistant varieties of cotton. Considering the fact that an estimated 300,000 to 600,000 bales of cotton are annually destroyed by the root rot disease - not to mention more than 500 other species of cultivated and non-cultivated plants, it is very evident that these coordinated efforts are essential to profitable cotton culture over large areas of the Southwestern States.

In the efforts now being made to place the Cotton Belt agriculture on a sound business basis, farm management researches and demonstrations will play an increasingly important role. In addition to a more adequate plan of cotton marketing, the Cotton Belt needs better types and systems of cotton farming. It is the business of the farm management research specialist to learn how to blend the varied resources of the farmers into the most profitable farm organizations. He must consider such items as the soil, topography, climate, crop and livestock adaptations, the market prospects, and even the personality, inclinations, and

abilities of the individual farmers as managers.

The farm economists and the rural sociologists are dealing with very broad problems, neither so clear-cut nor delimited in scope as those ordinarily encountered in the natural sciences. To safeguard conclusions, therefore, projects in farm management, marketing, and rural life, may often be carried to greatest advantage in association with appropriate technical departments. The subject-matter specialist can often contribute important details to the projects of the social group. The agronomist, for example, should be the better authority on soils, varieties of cotton and other crops, cultural methods and the like. The animal husbandman, on types of livestock, their breeding, feeding, and management.

The farm economist, on the other hand, should be the better judge of the economic relationships of soils, crops, livestock, market prices, and types of farm organization. He also has much to contribute to the researches of the subject-matter specialists, in the form of economic viewpoints and broad perspectives of the larger needs of agriculture. In the interest of efficiency, each type of specialist should work primarily in his own field and cooperate with the other. The agronomist should remain agronomist and the farm economist should remain farm economist, except as training and experience might suggest shifts in professional work. The essential feature of coordinated effort is to assign to each specialist the particular task for which he is best suited, everything considered.

Many additional examples of regional and even national problems affecting prosperity of Cotton Belt farmers might be cited wherein

the cooperation and coordination of effort would yield abundant results. Among these are the development, maintenance, and adoption of suitable varieties of cotton, both yield and spinning quality considered, from one end of the Cotton Belt to the other; the eradication and control of pests, including weeds, insects, and diseases which exact immense tolls of the farmers from year to year; the broad question of land utilization; farm finance and rural credits; taxation; the use of improved farm implements and machinery; the place of livestock on Cotton Belt farms; the relation of the size of farms to incomes; prices; and others too numerous to mention.

If Cotton Belt agriculture is to be placed upon a sound business basis, new and more exacting demands will be made upon the several research agencies and upon the energies of their respective heads. A new and more convincing type of agricultural information will be required. To meet these demands squarely, and to measure up fully to the occasion, will necessitate a keen appreciation of both the scientific method of research and of scientific relationships among men. New scientific talent must be discovered and developed, and the more experienced deployed to strategic positions of constructive leadership. Existing projects must be reexamined from time to time as to their objective, method, and intensity. Ill-designed projects must be discarded and replaced by more significant studies. Isolated and fragmentary researches must be woven into well-balanced programs of coordinated effort.

More and more, it is being realized that individual effort, however

effective, is proving largely inadequate for present-day needs. The work must be correlated and no sector left unguarded in the front line attack. Throughout, the guiding thought must be to retain all the benefits of individual initiative and scientific freedom and, at the same time, to take the fullest advantage of the greater strength and effectiveness which collective thought and coordinated effort bring to research organization as a whole. The full strength of modern science must be mustered and brought to bear upon the obstacles confronting Cotton Belt agriculture.

Out of these broader efforts, should arise less wasteful and more purposeful programs of production, more equitable and profitable marketing plans, and greater progress in that art of arts, the art of living well.